CLAIMS

1. A method for coating a carbon velvet material attached to a cathode to make a field emission cold cathode, comprising:

forming a solution of a low work function cesiated salt and de-ionized water;

spraying the carbon velvet material with the cesiated salt solution to form a coated carbon velvet material;

baking the coated carbon velvet material at a temperature of at least 100 °C for approximately an hour in a vacuum oven evacuated to less than 1 torr.; and

venting the vacuum oven to an atmospheric pressure using dry nitrogen.

2. A coating method as recited in Claim 1, wherein the spraying step includes pressurizing a spraying means with dry nitrogen.

3. A coating method as recited in Claim 1, wherein the cesiated salt is selected from a group consisting of cesium tellurate and cesium bromide.

4. A coating method as recited in Claim 1, wherein the steps of forming, spraying, baking, and venting are repeated until a film of cesiated salt having a thickness of 1 angstrom to 10 microns is formed on each of a plurality of shafts of the carbon velvet material.

5. A method of making a field emission cold cathode, comprising:

forming a solution of a cesiated salt;

coating a carbon velvet material with the cesiated salt solution; and

bonding the carbon velvet material to a cathode.

6. A method as recited in Claim 5 wherein the carbon velvet material is comprised of shaft having tips, and the coating step coats only the tips with the cesiated salt solution.

7. A method as recited in Claim 5 wherein the carbon velvet material is comprised of shafts, and the coating step coats a plurality of the shafts with a film of cesiated salt having a thickness of 1 angstrom to 10 microns.

8. A method of making a field emission cold cathode, comprising:

depositing a vaporized cesiated salt solution onto fibers of a carbon velvet material;

forming cesiated salt crystals on the fibers; and

bonding the carbon velvet material to a cathode.

9. A method as recited in Claim 8 wherein the solution includes de-ionized water and the forming step is comprised of evaporating the de-ionized water.

10. A method as recited in Claim 9 wherein the fibers have tips, and the cesiated salt crystals are formed only on the tips.

11. A method of making a field emission cold cathode, comprising:

forming a film of cesiated salt having a thickness of 1 angstrom to 10 microns on each of a plurality of shafts of a carbon velvet material; and

bonding the carbon velvet material to a cathode.

12. A method as recited in Claim 11 wherein the shafts have tips, and the film is formed only on the tips.

13. A method of making a field emission cold cathode comprising:

attaching a carbon velvet material having fibers to a cathode;

dipping the fibers in a molten cesiated salt solution; and

cooling the solution while the fibers are immersed in the solution.

14. A method as recited in Claim 13 wherein the fibers have tips, and only the tips are dipped in the molten cesiated salt solution.

15. A method of making a field emission cold cathode comprising:
attaching a carbon velvet material having fibers to a cathode;
dipping the fibers in a molten cesiated salt solution;
removing the fibers from the solution; and
cooling the fibers after the fibers have been removed from the solution.

16. A method as recited in Claim 15 wherein the fibers have tips, and only the tips are dipped in the molten cesiated salt solution.

17. A method as recited in Claim 15 wherein the steps of dipping, removing and cooling are repeated until a film of cesiated salt having a thickness of 1 angstrom to 10 microns is formed on a plurality of the fibers.

18. A method as recited in Claim 17 wherein the fibers have tips, and only the tips are dipped in the molten cesiated salt solution.